



Thank you for choosing EMM Labs...

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Safety Instructions

Prior to Installing you new EMM Labs product please read the following safety instructions:

- Read and follow all instructions.
- Keep these instructions.
- Do not use or install product near any sources of water, rain and/or moisture.
- Clean using only a dry cloth.
- Install only in accordance with the manufacturer's instructions.
- Refer all servicing to approved service personnel.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not install product outdoors or in direct sunlight.
- Leave at least 10cm or 4 inches around product to ensure proper ventilation.
- Do not place product near strong electrical or magnetic radiation/emissions or near a power amplifier.

This EMM Labs product must be connected to a mains socket outlet with a protective earthing connection (grounding pin).

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO WATER OR MOISTURE.

EEC: This product has been designed and tested to comply with the limits set out in EN55013, EN55020 and EN 60065:2009 (electrical safety).



Warranty

EMM Labs warrants the DAC2X product against defects in material and workmanship under normal use and service for a period of time specified by the product's serial number from the date of first delivery to the owner. The warranty time period is 5 years. Warranty is limited to the original owner and is non-transferable.

EMM Labs will pay for return shipping charges back to the owner when the product is sent to EMM Labs within the first 90 days after purchase (US and Canada end-users only). Otherwise, owner will be responsible for all shipping charges to and from EMM Labs.

For all warranty claims, a copy of the original invoice must accompany the product.

Opening the product or modifying it in any way by the owner, including but not limited to cryogenic treatment, will void any warranty.

Please contact EMM Labs (support@emmlabs.com) for RMA number and shipping instructions before shipping any product to EMM Labs.

EMM Labs products are sold worldwide through authorized dealers with restricted territories. EMM Labs product purchased from non-authorized dealers or from a dealer selling outside his / her authorized territory will automatically void product warranty.

DAC2X AUDIO CONVERTER

The DAC2X is a high-performance stereo D/A converter with a wide variety of user selectable digital inputs. It has evolved from EMM Labs acclaimed converter systems which are used worldwide in professional studios to create some of the finest recordings.

The DAC2X provides conversion from a wide variety of digital input formats, including USB Audio for computers, media systems and digital audio playback machines making it an extremely flexible converter system that can act as a standalone conversion hub to a host of digital sources.

The DAC2X has:

- Proprietary MFAST technology for getting rid of source jitter.
- Proprietary MDAT DSP that upsamples and conditions digital audio to twice the SACD/DSD (5.6Mhz) samplerate.
- Ed Meitner's proprietary discrete Dual Differential DACs.
- Proprietary Masterclock for sub-pico second jitter performance.
- Uses our exclusive aerospace grade composite laminate pcbs.
- Supports up to 24bit, 192kHz on all PCM inputs including USB
- Supports DSD streaming over USB
- Supports DSD for CD/SACD playback over EMM Optilink

The DAC2X, when paired with an EMM Labs transport, performs as an unparalleled CD/SACD playback system.

Features & Specifications

2-Channel D/A conversions:

- from PCM (44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz, 192kHz) to analog
- from DSD to analog via USB (DSD streaming over USB using DoP 1.0 specification)
- from DSD to analog via EMM Optilink (SACD/CD playback)

Supported digital input formats:

- AES/EBU
- Two COAX SPDIF
- Two TOSLINK SPDIF
- EMM Optilink
- USB Audio

Analog outputs and impedances:

- Balanced on XLR (300 Ω)
- Unbalanced on RCA (150 Ω)

Output levels:

- XLR outputs: 4.6V (+15.45dBu)
- RCA outputs: 2.3V (+9.45dBu)

Note:

1. XLR analog outputs are balanced with pin 2 hot, pin 3 cold and pin 1 ground.
2. For proper digital audio data transfer (especially at 176.4kHz and 192kHz) appropriate high quality TOSLINK, SPDIF, AES and USB 2.0 cables must be used.

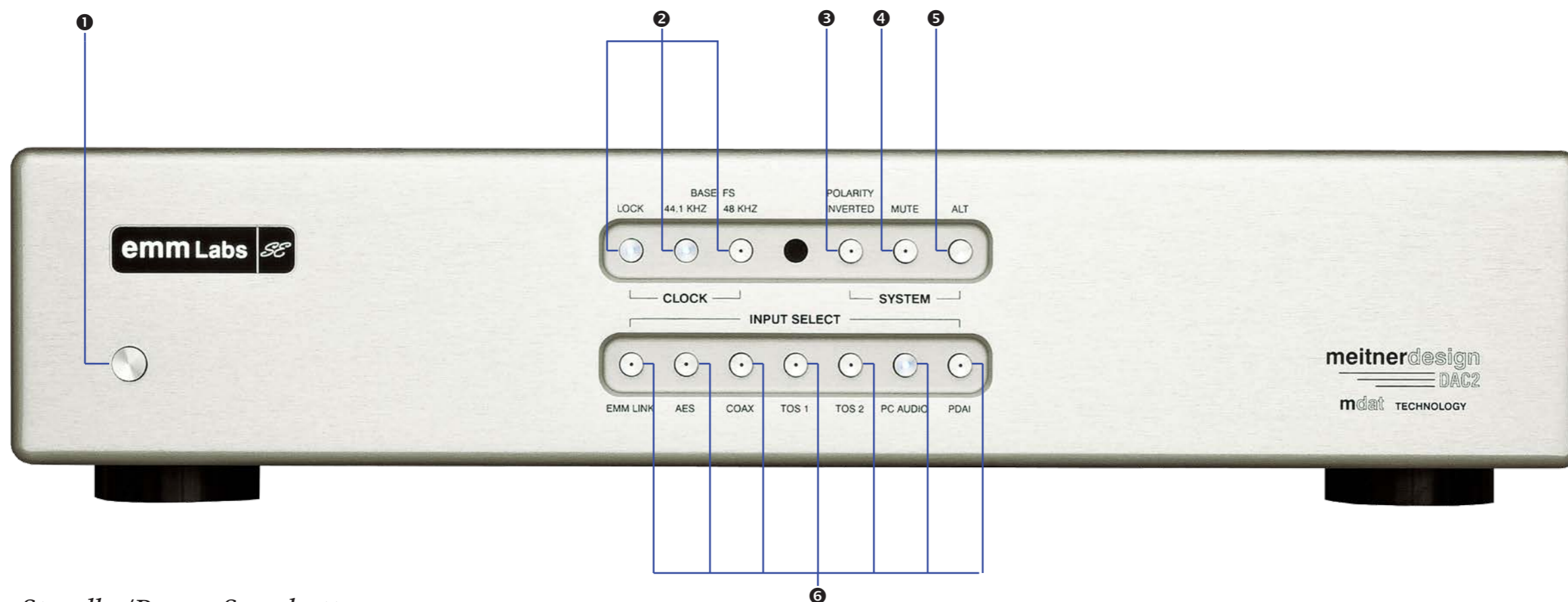
Features & Specifications

System control via Infrared remote and serial RS-232 ports (*see Appendix A*)

Power supply:

- Power factor corrected
- Factory set to 100V or 115V or 230V, 50/60Hz operation
- Power consumption: 25W
- Remote control: Infrared
- Dimensions W x D x H: 435 x 400 x 92mm
- Weight: 12kg

Front Panel & Functions

1. *Standby/Power-Save button:*

Toggles the operation between on and power-save mode. In power save mode the remote control and all front panel functions become inactive.

2. *Clock Control Indicators:*

LOCK: This indicator is lit when the unit detects valid digital clock at the selected digital audio input. For normal operation with digital audio inputs this indicator has to be lit or else all audio outputs will be muted.

44.1kHz / 48kHz: These indicate the base frequency for the selected digital audio input. Eg. digital inputs with sample frequencies of 44.1, 88.2 and 176kHz the 44.1kHz indicator will be lit. For digital inputs with sample frequencies of 48, 96 and 192kHz the 48kHz indicator will be lit.

Front Panel & Functions

When receiving valid DSD data via USB input the 44.1 and 48 LEDs will light.

3. *POLARITY INVERTED button:*

When this button is lit the polarity of all analog outputs are inverted. The inversion is performed in the digital domain.

4. *MUTE button:*

When lit all outputs are muted. Pushing the button again unmutes the outputs.

5. ALT button (intended for future use)

6. *Digital input selector buttons:*

- EMM LINK: Selects the EMM Optilink input for interconnection with an EMM Labs transport (TSD1 or TSDX). The cables used are ST glass (multimode) supplied with the transport.
- AES: Selects AES/EBU (XLR) format PCM digital audio input .
- COAX: Selects SPDIF (RCA) format PCM digital audio from COAX connector.
- TOS1: Selects SPDIF (TOSLINK) format PCM digital audio from TOS1 connector.
- TOS2: Selects SPDIF (TOSLINK) format PCM digital audio from TOS2 connector.
- PC AUDIO: Selects USB format digital audio from USB Audio connector (computer, media player, media or audio server).
- PDAI: Selects SPDIF (RCA) format PCM audio from PDAI connector.

All PCM digital inputs support 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz and 192kHz. All digital inputs support word lengths up to 24bit.

USB Audio input supports DSD (1bit, 2.8Mhz) streaming over USB using DoP 1.0 specification.

Rear Panel & Functions



1. *Main Power Switch*
2. *Main Power connector*
3. *Product VOLTAGE indicator:*
Indicates working voltage of the DAC2X. Only use with indicated line voltage.
4. *Product model and serial number indicator:*
Warranty void if model/serial number indicator is not attached to unit, missing or damaged whereby serial number cannot be seen.

Rear Panel & Functions

5. *Digital Inputs (All PCM inputs supporting up to 24bit, 192kHz):*

- EMM Optilink: input for interconnection with an EMM Labs transport.
- AES/EBU: AES/EBU (XLR) PCM digital audio input.
- COAX: SPDIF (RCA) format PCM digital audio input.
- TOS1: SPDIF (TOSLINK) format PCM digital audio input.
- TOS2: SPDIF (TOSLINK) format PCM digital audio input.
- USB Audio: USB PCM and DSD audio from a computer, media player, server
- PDAI: SPDIF (RCA) format PCM digital audio input.

6. *Analog Line Output:*

- Left and Right Balanced (XLR) Connectors
- Left and Right Un-Balanced (RCA) Connectors
- Output Line Level with 0dBfs signal on AES/EBU input:
 - XLR outputs: 4.6Vrms (+15.45dBu)
 - RCA outputs: 2.3Vrms (+9.45dBu)

7. *System*

Remote:

- Wired RS232: RS232 communication port. See Appendix A.

Service:

- USB data port for firmware upgrades (see separate USB update instructions)
- RESET button used to temporarily access the backup firmware. Only for diagnostic purposes. Should not be used during normal operation.

Basic Operations and Input Connections

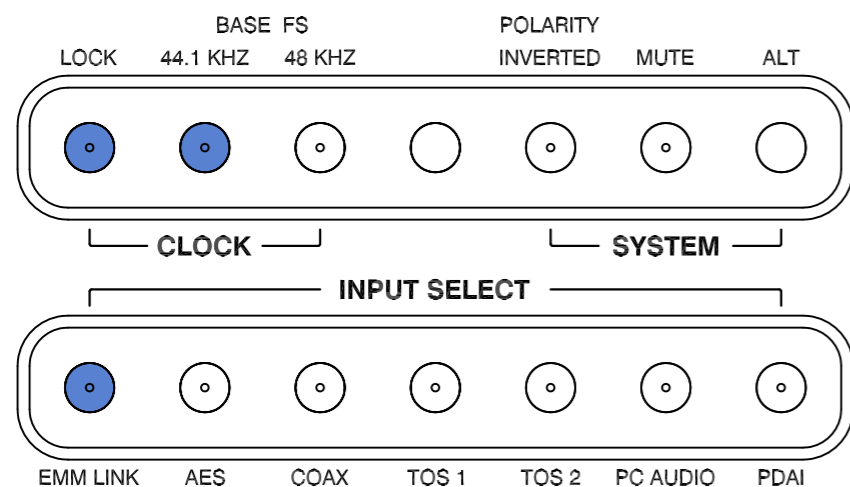
1. *Memory:*

After 10 seconds when no button has been pushed or changed, the DAC2X memorizes its momentary setup in permanent memory for later retrieval after the next powerup. It will be recalled immediately after the unit is turned on. Each individual input selection will keep its last configuration before powerdown.

During normal operation each input selection will immediately memorize its configuration so that switching between different sources with different configurations can be accomplished with a single button selection.

2. *DAC2X Input Connections:*

Just connect the appropriate digital source output to the specific DAC2X input, on the back of the DAC2X and select the appropriate digital source from either the front panel buttons or the remote control.

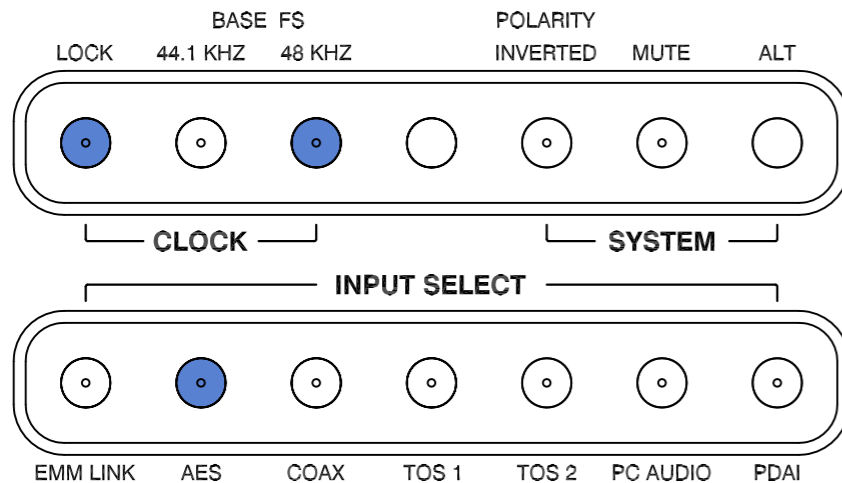


Typical front panel display when DAC2X is locked to 44.1kHz base frequency and the

Basic Operations and Input Connections

2. DAC2X Input Connections (cont'd):

EMM Optilink is selected as the digital source (connected to an EMM Labs transport). SACD or Redbook audio has base samplerate of 44.1kHz.



Above is another example. Here the DAC2X is connected to an AES digital source with a base frequency of 48kHz (PCM 48, 96 or 192kHz audio). For AES connections the DAC2X uses a single AES input to carry 2 channels of PCM audio up to 192kHz.

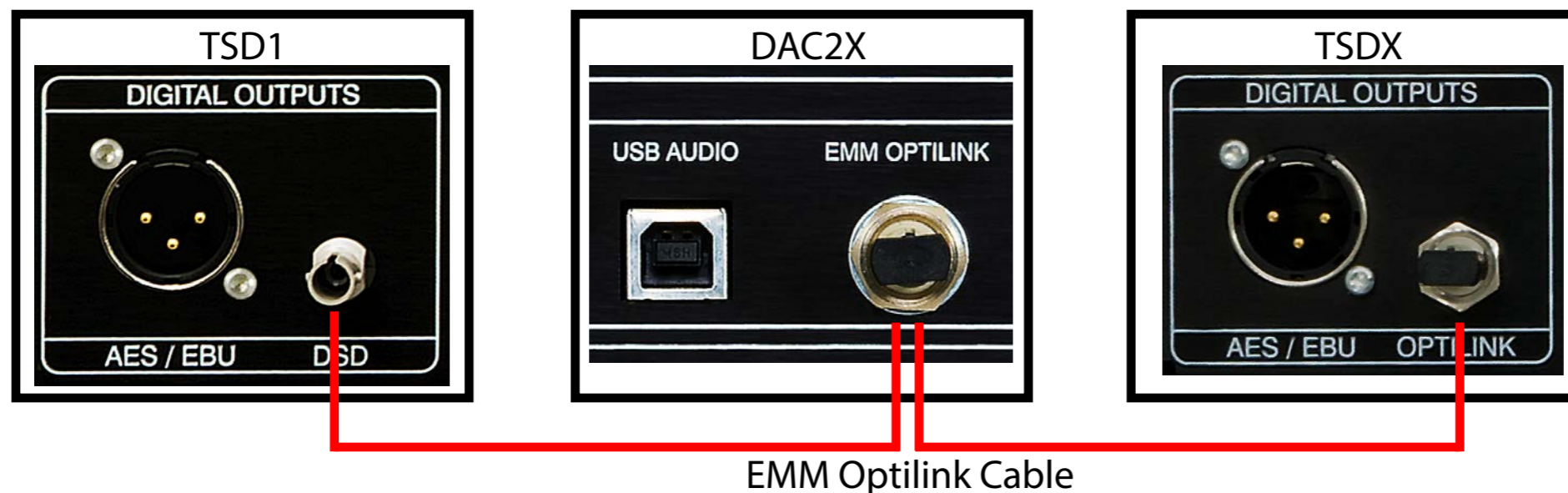
NOTE: If the LOCK light is not ON then the DAC2X is not receiving appropriate digital audio from the digital source. The DAC2X will automatically mute all the outputs if it does not receive a proper digital audio signal from the selected source. Check the source setup and cable connections for problems. When detecting DSD data over USB both 44.1 and 48 LEDs will simultaneously be lit.

3. Using the remote and pressing the “Display DAC” button turns off all the DAC2X LEDs except the LOCK light.

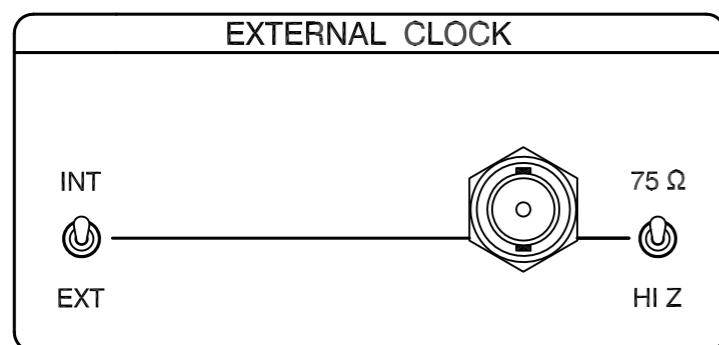
Basic Operations and Input Connections

4. TSD1 or TSDX+DAC2X Quick Connect:

Connect the EMM Optilink cable from the TSD1 or TSDX to the DAC2X



Make sure the TSD1 External Clock switch is set to internal



Using either the remote or the front panel of the DAC2X select EMM Link.
The LOCK light and the 44.1kHz sync. light both should be lit on the DAC2X.

Basic Operations and Input Connections

5. DAC2X USB Audio:

- a. First, use only an appropriate well-shielded certified USB 2.0* cable to connect the DAC2X's USB Audio input to any USB digital audio source component (computer, laptop, media server etc.).
- b. The DAC2X USB Audio interface uses the B-type USB connector similar to connectors used on printers. Please see image below:



- c. Select the USB Audio input using front panel input selector buttons.
 - d. For MAC OSX systems, no driver is needed. OSX has the appropriate USB driver already installed.
 - e. For Windows XP, Vista (32 or 64bit) and Windows 7 (32 or 64bit) systems install the provided USB audio driver located on the software CD in the folder named "DAC2X USB Audio Driver". Read and follow the installation instructions.
 - f. Kernel, ASIO and WASAPI (Vista and Windows 7) drivers will be installed.
6. For Windows Media Player playback; in Windows Control Panel set the default sound playback to the DAC2X USB Audio device (XMOS XS1-L1 Audio).

*Not using proper cables will cause audio issues between digital source and DAC.

Basic Operations and Input Connections

7. In general for most audio applications you will be able to select the DAC2X USB Audio device (XMOS XS1-L1 Audio) from within the application and choose the appropriate driver Kernel, ASIO or WASAPI.

DSD Audio

1. The DAC2X currently supports DSD audio streaming and conversion over USB using DoP 1.0 specification.
2. Please make sure that your DAC2X has the latest installed software and drivers. If unsure please email support@meitner.com with your DAC2X serial number and our engineers will be able to tell you if you need to update your unit.
3. Currently there are many different media players that support DSD audio file (extension DFF and DST files) playback. Some of them that have been fully tested in-house eg. JRiver for Windows, and Audivarna and Pure Music for OSX.
4. Every media player will have specific software installation instructions and setup procedures for enabling DSD streaming. Please consult the specific software manual.
5. Some software manufacturers have also provided quickstart and software setup guides for download and online. If available EMM Labs will post links to this in the support section of the DAC2X website.
6. When setup correctly DSD data detected by the DAC2X will cause both the 44.1 and 48kHz LEDs to light up.

Infrared Remote Control

The remote control provides combined functions for both the DAC2X and EMM Labs transport. The functions that are relevant to the DAC2X:

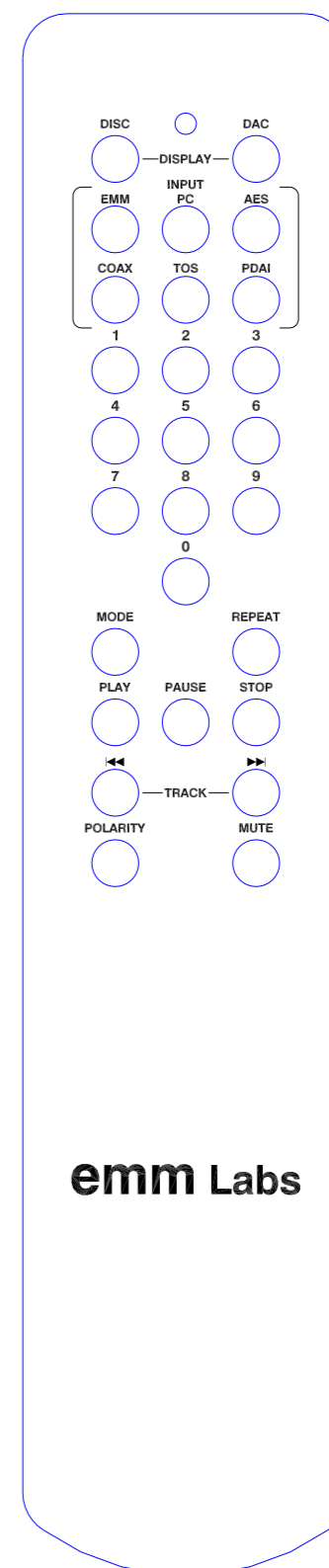
DAC: This function toggles the front panel LEDs ON or OFF on the DAC2X. When in OFF mode only the LOCK LED would be lit.

INPUT: These buttons are used to select the digital source input:

- **EMM** : Selects the EMM Optilink input.
- **AES** : Selects AES/EBU format PCM digital audio via XLR
- **COAX** : Selects SPDIF format PCM digital audio via coax/RCA connector
- **TOS** : Toggles between TOSLINK SPDIF format PCM audio from either TOS1 or TOS2 connectors.
- **USB** : Selects USB PCM audio via USB interface.
- **PDAI** : Select PDAI SPDIF format PCM digital audio via coax/RCA connector

POLARITY: Toggles the analog output polarity. Polarity inversion is performed in the digital domain.

MUTE: Mutes the outputs.



Serial Remote Control (RS232)

The DAC2X is equipped with a 9-pin RS232 port for system remote control via a serial cable (not provided by EMM Labs). Please use a standard RS232 cable. Do not use a null modem cable, as this will not work. RS232 communication port settings:

- 19,200 baud
- 8 bits
- 1 stop bit
- no flow control
- no parity bit

Commands to the DAC2X

All commands sent to the DAC2X consist of 3 ASCII characters (all lowercase) followed by a carriage return or <CR>. Repeating a <CR> will repeat the last command sent. Received commands are not stored in a stack. They need to be sent in intervals of at least 50ms to allow enough time for the DAC2X to execute a command before receiving the next one.

Command	Function
pha	Toggles the analog output polarity
mut	Mutes the outputs
emm	Selects the EMM Optilink input
aes	Selects AES/EBU format PCM digital audio via XLR
coa	Selects SPDIF format PCM digital audio via coax/RCA connector
to1	Selects TOSLINK format PCM digital audio via TOS1 connector
to2	Selects TOSLINK format PCM digital audio via TOS2 connector

Commands to the DAC2X (cont'd)

Command	Function
usb	Selects USB PCM audio via USB interface
pda	Selects SPDIF format PCM digital audio via PDAI/RCA connector

Status bytes sent from DAC2X

The DAC2X sends back 4 Bytes terminated with a <CR> whenever any status changes.

<Byte 0><Byte 1><Byte 2><Byte 3><CR>

Byte 0 ASCII '0' - Not Used

Byte 1 ASCII '0' - Not Used

Byte 2

- bit 0 Not Used
- bit 1 Not Used
- bit 2 Status of EMM Link input (0 when selected)
- bit 3 Status of USB input (0 when selected)
- bit 4 Status of AES input (0 when selected)
- bit 5 Status of COAX input (0 when selected)
- bit 6 Status of TOS1 input (0 when selected)
- bit 7 Status of TOS2 input (0 when selected)
- bit 8 Status of PDAI input (0 when selected)

Byte 3

- bit 0 Lock Status, 1 when locked
- bit 1 Not Used

Status bytes sent from DAC2X (cont'd)

Byte 3

- bit 2 0 when 44.1kHz selected as base sample frequency
- bit 3 0 when 48kHz selected as base sample frequency
- bit 4 Status of polarity of analog outputs (0 when inverted)
- bit 5 Not Used
- bit 6 Status of mute (0 when muted)
- bit 7 Not Used

Byte 4 <CR> (0x0D)